



Surface Detection and Segmentation

Dahl, Vedrana Andersen

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MEK/Compute seminar, 3 October 2014

Surface detection

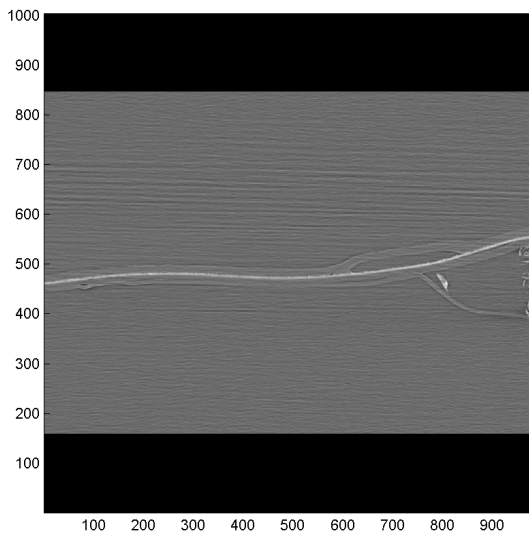
$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$

$$\Delta \int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} =$$

$$\infty \equiv \{2.7182818284\}$$

$$\chi^2 \sum_i !$$

Motivation



$$7e^{i\pi} = 18284$$

Optimal surface search

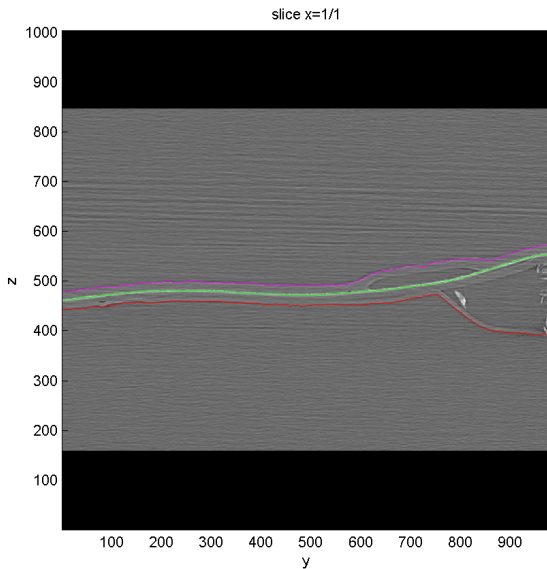
Problem

- ▶ Surfaces in 3D volume
- ▶ Local smoothness constraint
- ▶ Data support

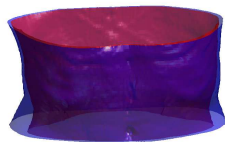
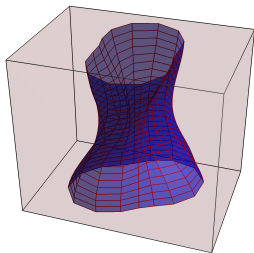
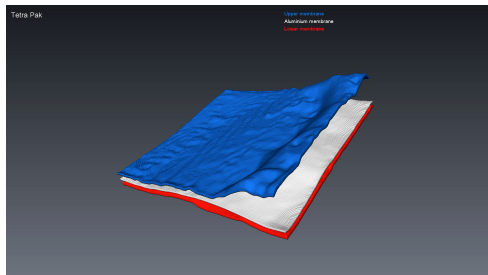
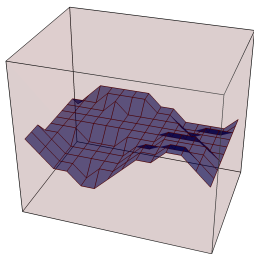
Solution

- ▶ Graph based
- ▶ Flexible

Tetrapak

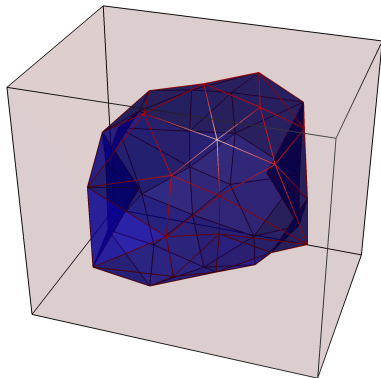


Terrain-like and tubular surfaces

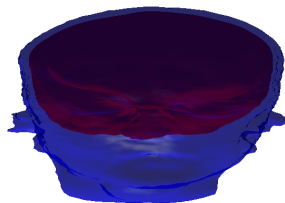


Grid based solution, allows detecting multiple interrelated surfaces

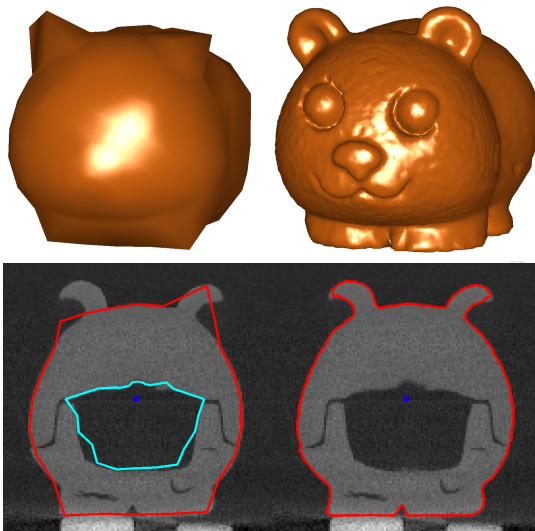
Round surfaces



Mesh based solution



Round surfaces



Allows detecting multiple interrelated surfaces and iterative refinement

Image segmentation using the deformable simplicial complex method

$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$

$$\int_a^b \varepsilon \Theta = \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

$$\chi^2$$

$$\Sigma!$$

Deformable models and DSC

Deformable models for image segmentation

- ▶ Curves or surfaces that can move under: internal forces (smoothness or other prior info) and external forces (image or volume data).
- ▶ Depending of the representation of the interface: parametric deformable models (explicit interface, Lagrangian framework) or geometric deformable models (implicit interface, Eulerian framework).

The deformable simplicial complex method

- ▶ generic method for tracking deformable interfaces (curves in 2D, surfaces in 3D)
- ▶ applications in fluid simulation, topology optimization, now also image segmentation

DSC segmentation current work

- ▶ 3D
- ▶ Texture segmentation

$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$

$$\int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

$$\chi^2 \sum_i !$$

Thank you!

$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$

$$\Delta \int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

$$\chi^2 \sum_i !$$